approaches that can meet the various demands and be easily implemented in practice. This is a network reliability problem which is extendable to the optimization of evacuation strategies under terrorists' attacks, chemical leakage, seismic occurrences, and so on.

4 - Optimal Routing in Disaster Response
Zhuoxiu Zhang, Mississippi State University, PO Box 9542, Mississippi State, MS, 39762, United States, zz52@msstate.edu, Burak Eksioglu, Ismail Capar, Mingzhou Jin

A linear programming model is developed to minimize disruption of freight flow and passenger movement in the event of a disaster. The model tries to optimally route vehicles with communication devices while capturing the routing behaviors of other vehicles. Because of the nonlinear relationship between the speed and traffic density, the LP model is solved iteratively by updating the parameters based on duel prices.

■ TA39

Logistics I

Contributed Session

Chair: Mengfei Yu, PhD Candidate, RSM Erasmus University, RoomT10-46, Burg. Oudlaan 50, PO Box 1738, Rotterdam, 3000DR, Netherlands, myu@rsm.nl

1 - Design of Robust Topologies for Logistics Networks
Maarten Hendriks, PhD student, Eindhoven University of Technology, Den Dolech 2, PO Box 513, Eindhoven, NB, 5600 MB, Netherlands, m.p.m.hendriks@tue.nl, Dieter Armbruster, Jan Tijmen Udding, Erjen Lefeber, Koos Rooda

We consider the distribution of goods from manufacturers to customers by a logistics provider, who cannot control the stochastic supplies and demands, but may store goods in warehouses. He has to determine which links to use and how much to ship through them to minimize costs and meet demands. We propose a method to find a cost-effective topology, which is only sensitive to the means of supply and demand distributions. A cost-effective topology can thus be constructed when the means are known.

2 - Logistics and Economic Development. The Aguascalientes Case
Jaime Escalera, External Relations Director, Univ Politecnica de Aguascalientes, Prol Mahatma Gandhi Km 2, San Francisco del Arenal, Aguascalientes, AG, 20280, Mexico, jaime.escalera@upa.edu.mx

Quantitative economic analysis as well as comparison of Aguascalientes to other logistics points or shipping centers in Mexico, and the US; we examine AGS in a broader regional context to identify issues and challenges shared with neighboring states, and identify opportunities for inter-state collaboration; an initiative between USC and UPA to understand regional economic development in an international context.

3 - An Applied Logistics Decision Support System
Tan Miller, Senior Director, PCH Logistics, Pfizer, Inc., 201 Tabor Road, Morris Plains, NJ, 07950, United States, tan.miller@pfizer.com

We review the development and implementation of a DSS designed to guide the daily inventory deployment activities of a large-scale consumer distribution networks. We focus on how a well-constructed DSS can effectively augment the planning capabilities of ERP and WMS systems.

4 - Yard Allocation for a Container Port
Loo Hay Lee, Associate Professor, National University of Singapore, 10 Kent Ridge Crescent, Singapore, 119260, Singapore, iseleelh@nus.edu.sg, Yongbin Han, Kok Choon Tan, Ek Peng Chew

In this talk, we will study the yard storage allocation problem of a busy transshipment hub. Generally, the reshuffling of containers and the traffic congestion are two main challenges in the problem. To address the issues, we use the consignment strategy, the high-low workload and the vicinity matrix concept. By considering these new concepts and other actual constraints imposed by the port operator, we solve the problem by developing a mixed integer programming model.

5 - Performance Approximation and Design of Pick-and-Pass Order Picking Systems
Mengfei Yu, PhD Candidate, RSM Erasmus University, Room T10-46, Burg. Oudlaan 50, PO Box 1738, Rotterdam, 3000DR, Netherlands, myu@rsm.nl, René de Koster

We discuss an approximation method based on queueing theories to analyze pick-and-pass order picking systems. The objective is to provide an instrument for obtaining rapid estimation of the performance of the order picking system. This method can be used to evaluate the effects of the storage methods in pick stations, the number of order pickers in pick stations, the size of stations, the arrival process of customer orders, and the impact of batching and splitting orders on system performance.

■ TA40

Tutorial: Unifying Facility Restricted Location and Layout Theory

Sponsor: Location Analysis
Sponsored Session

Chair: Rakesh Nagi, Professor, Department of Industrial & Systems Engineering, 438 Bell Hall, University at Buffalo (SUNY), Buffalo, NY, 14260, United States, nagi@buffalo.edu

1 - Tutorial: Unifying Facility Restricted Location and Layout Theory
Rakesh Nagi, Professor, Department of Industrial & Systems Engineering, 438 Bell Hall, University at Buffalo (SUNY), Buffalo, NY, 14260, United States, nagi@buffalo.edu, Rajan Batta

This tutorial aims at synthesizing a common theory base in the context of facilities location and facilities layout. The dichotomy has arisen due to the "point" or "area" treatment of the new facility. Participants will gain an appreciation of the common theory for location and layout problems, and how these results can help advance each field or bring them closer. It is suitable for students and researchers alike. We will draw upon research results of two NSF awards and associated papers.

■ TA41

Queueing: Old Problems and New Techniques

Sponsor: Applied Probability
Sponsored Session

Chair: Alan Scheller-Wolf, Associate Professor, Tepper School of Business, Carnegie Mellon University, Pittsburgh, PA, 15213, United States, awolf@andrew.cmu.edu

1 - Pressure-Based Decentralized Resource Allocation in Stream Processing Systems
Cathy Xia, Research Staff Member, IBM, 19 Skyline Drive, Hawthorne, NY, 10532, United States, cathyx@us.ibm.com, Li Zhang, Zhen Liu

Distributed stream processing architecture has emerged as an appealing solution to coping with the analysis of stream data from dispersed sources. A fundamental problem in such distributed systems is how to best utilize available resources to achieve the optimal overall system performance. Queueing network models are well suited to model such stream processing systems. We present pressure-based decentralized solutions for the dynamic resource allocation problem in the above setting.

2 - Dynamic Pricing for On Demand Bandwidth Services
Robert Hampshire, PhD Candidate, Princeton University, Princeton, NJ, 08544, United States, rhampshi@Princeton.EDU

Motivated by a bandwidth leasing service, we consider a loss system model with a finite amount of bandwidth. Viewing demand as a function of the service price and time, we construct a dynamic pricing policy that maximizes profit while satisfying the quality of service constraints of the customers. Optimal control theory and calculus of variations are employed to develop the congestion pricing policy. This is joint work with Prof. W.A. Massey of Princeton and Qiong Wang of Lucent Technologies.

3 - Fundamental Characteristics of Queues with Fluctuating Load
Varun Gupta, Doctoral Student, Computer Science Department, Carnegie Mellon University, Pittsburgh, PA, 15213, United States, varun@cs.cmu.edu, Mor Harchol-Balter, Alan Scheller-Wolf, Uri Yechiali

Systems with fluctuating arrival or service rates are very common, but are still not well understood analytically, even for an M/M/1 system. For example, does increasing the rate of fluctuation cause the mean response time to increase or decrease? Is it even monotonic? How do the performance experienced by users arriving into "high load" periods and "low load" periods compare? Are there stochastic relations between these? In this work, we provide the first answers to such fundamental questions.